

“earthed microwave shield in the form of a perforated plate” toward a workpiece (see, e.g., Col. 3: 35- 56).

Applicants’ amended independent claim 14 claims a plasma generating means that includes an electrode having a hollow electrode body, supply openings that are adapted to feed the process gas and that are bored in the end of the electrode body to face away from the intended workpiece, and through holes bored through the electrode body to extend from the end at which the supply openings are formed to the opposite end (see, e.g., electrode 22 in Applicants’ FIGs. 1A, 1B).. Applicants respectfully disagree with the Examiner’s characterization that the claimed electrode differs from the microwave shield of Pedder only with regard to “intended use.”

In sharp contrast to the microwave shield disclosed by Pedder, Applicants’ claimed electrode includes a hollow body for receiving supply gas and supply openings which are bored into an end surface of the hollow body and through holes which extend through the hollow body from the end surface at which the supply openings are provided through to a surface at an opposite end (see, e.g., page 25, line 9 through page 26, line 6 of Applicants’ specification). Pedder’s disclosed microwave shield fails to include or suggest each of the claimed elements in Applicants’ electrode.

The claimed elements in Applicants’ electrode perform a unique function. Plasma ions generated in the supply gas within the electrode are ejected through the supply openings, which are located in an end surface of the electrode that faces away from the workpiece. The through holes serve as “H tunnels” for trapping the plasma ions as they pass into the through holes after exiting the supply openings. This trapping prevents a violent collision of ions with the workpiece, thereby protecting a passivation film and/or other components of the workpiece from damage (for example, physical etching caused by collisions with the ions). This enables active species that are generated during the plasma reaction to pass through the through holes to etch the workpiece by means of a soft, chemical reaction (see, e.g., page 27, line 16 through page 28, line 12 of Applicants’ specification).

(see, e.g., Col 4: 43 - 49 of Todd). The Examiner suggests that Todd's inert gas mixture is use for roughening the surface of the soldering surface. Applicants respectfully disagree.

Todd discloses the application a heated reactive gas (fluorine) followed by the application of an inert gas mixture (including hydrogen) for the purpose of removing oxides from a soldering surface. Todd nowhere indicates or suggests that either step is used for roughening the surface of a soft solder alloy as claimed by Applicants. Significantly, in addition to removing oxide films from the surface of a soft solder alloy, Applicants' claimed roughening step further causes a new surface of the solder to be exposed. The new surface is exposed to the fluorine layer in the treatment step, and provides for improved solderability over non-roughened surfaces (see, e.g., page 58, lines 2 - 10 of Applicants' specification).

Applicants' disclose a plasma excitation of an inert gas/hydrogen mixture as one mechanism for performing the roughening step. While Todd's process also uses such an inert gas/hydrogen mixture, Todd fails to teach or suggest that this gas mixture is administered as a plasma excitation. Moreover, Todd's disclosed system provides no means for generating such a plasma.

Todd neither teaches nor suggests any other mechanism for roughening the surface. Even assuming *arguendo* that Todd's inert gas mixture could be roughening, Todd applies this mixture after applying the reactive fluorine gas. Thus, even in this case, unlike Applicants' claimed invention, Todd's process cannot be said to apply the reactive fluorine gas treatment to a solder surface that has been roughened by the inert gas mixture.

Accordingly, Applicants respectfully submit that the process and apparatus claimed in Applicants' independent claims 23, 41, 43 and 46 is not anticipated or made obvious by Todd, and that independent claims 23, 41, 43 and 46 therefore stand in condition for allowance.

For the above-argued reasons, Applicants respectfully request that the rejections of claims 14, 15, 17 and 20 - 22 under 35 U.S.C. § 102(b) be withdrawn.

IV. Rejections under 35 U.S.C. §103

Claims 16 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pedder in view of U.S. Patent No. 5,409,543 to Panitz et al. ("Panitz"). Claim 19 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Pedder in view of U.S. Patent No. 5,345,056 to Frei et al. ("Frei"). Applicants respectfully traverse these rejections.

Claims 24 and 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Todd in view of Frei. Claims 26 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Todd in view of Frei and Panitz. Claims 27, 28, 42, 44 and 47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Todd in view of U.S. Patent No. 4,921,157 to Dishon et al. ("Dishon"). Claims 45 and 48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Todd in view of Dishon and U.S. Patent No. 1,437,641 to Ferriere et al. ("Ferriere"). Applicants respectfully traverse these rejections.

Claims 16, 18 and 19 each depend from allowable claim 14. Claims 24 - 28 each depend from allowable claim 23. Claim 42 depends from allowable claim 41. Claims 44 and 45 each depend from allowable claim 43. Claims 47 and 48 depend from allowable claim 46. For at least these reasons, Applicants respectfully submit that dependent claims 16, 18, 19, 24 - 28, 42, 44, 45, 47 and 48 are also allowable.

Applicants therefore respectfully request that the rejections of claims 16, 18, 19, 24 - 28, 42, 44, 45, 47 and 48 under 35 U.S.C. § 103(a) be withdrawn.

V. New Claims

Applicants add new claims 55 - 57. As new claims 55 - 57 respectively depend from allowable claims 23, 43 and 46, Applicants respectfully submit that new claims 55 - 57 are allowable for at least this reason.

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

If there are any other issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

Dated: March 27, 2007

Respectfully submitted,

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